Testimony of
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Greeting and Overview

Mr. Chairman, Ranking Member Johnson, and members of the Committee, I am pleased to be here today to share with you the work of the National Science Foundation-supported El Paso Math/Science Partnership (MSP), and the opportunities that it provides for students across El Paso. Over the last decade, the National Science Foundation has been a valuable partner in supporting improved math and science instruction and achievement across the El Paso community. What the MSP now provides is an opportunity to bring together partners across the community, K-16, toward the shared development and implementation of high quality math and science content and instructional practices aimed at improving student achievement among all students.

Over the last decade, the community of El Paso has distinguished itself as one that is deeply committed to ensuring academic success among all students. In fact, education has come to be seen as a key element in improving the quality of life in our community, which is working very hard to turn around life chances for its large and growing population. Our strong focus on education in El Paso reflects the reality that there is much at stake in ensuring that this growing, largely Hispanic community is able to create opportunities for its 700,000 citizens. Currently, our per capita income lags behind both the state and the nation, and the median household income ranks sixth lowest in the United States. The overall educational attainment of our citizenry is low as well. Just 68 percent of the population (aged 25 and older) has earned a high school diploma and fewer than 16 percent of El Pasoans hold a bachelor's degree or higher.

Against these tremendous odds, the El Paso community has demonstrated its commitment to high academic achievement among all students. For example, the achievement gap, as measured by TAAS mathematics, is at its lowest point since El Paso's NSF-funded systemic reform efforts began in 1994. From a high that year of 21.2 percentage points between Hispanic and White students, and one of 26.7 points between African Americans and Whites, the gap has been reduced to 5.7 and 7.9 points respectively in 2002. In addition, enrollment in college preparatory math and science courses has increased significantly over the past year, with over three-fourths of all students across the MSP districts now taking Algebra I, Geometry, Algebra II, Biology and Chemistry. Most significantly, pass rates improved greatly over the past year—notably in Geometry (86%) and Chemistry (78%). These increases in enrollment and pass rates represent possibly the most important impact of NSF-supported work in El Paso schools.

And yet, enormous challenges remain, particularly in fully preparing students for math and science success in college. Shared concerns about this and other challenges has brought together 12 El Paso area school districts with the El Paso Community College and the University of Texas at El Paso to focus on identifying strategies for ensuring the academic success of our young people. We are grateful that funding for the El Paso MSP will allow us to address these critically important problems.

Key Components of the El Paso MSP

The El Paso Math/Science Partnership is built around five key priorities identified as critical to ensuring the academic achievement and opportunities for future success of El Paso area students. These include: one, increasing and sustaining the quantity and quality of preK-12 mathematics and science teachers; two, building the capacity of schools and districts to effectively support efforts to improve math and science instruction and achievement; three, aligning curriculum, instruction, and assessment of math and science education to ensure that what is taught reflects shared expectations for students from kindergarten through university; four, promoting efforts to increase college-going rates among El Paso area students; and five, conducting research that advances knowledge and understanding about the systemic improvement of mathematics and science instruction. Strategies addressing each of these priorities focus on local needs, though many have relevance to communities across the nation, which we hope will benefit from the lessons we learn in MSP.

<u>Increasing and Sustaining the Quantity and Quality of PreK-12 Mathematics and Science Teachers</u>

The first key element of the El Paso MSP addresses our efforts to increase and improve the quantity and quality of certified math and science teachers across our twelve partner districts. Strategies include roles for partners at UTEP, EPCC, the El Paso Collaborative for Academic Excellence, the Region 19 Educational Service Center, as well as participating districts, and range from increasing the number of fully certified math and science teachers, to providing intensive professional development to in-service teachers, to encouraging high school students to consider careers in math and science teaching.

Among the most notable accomplishments in the last year, are the enhancement of a Master of Arts in Teaching Mathematics (MATM) and the establishment of a Master of Arts in Teaching Science (MATS) program. Currently, 15 high school Mathematics teachers and 21 Science teachers are supported by the El Paso MSP and enrolled in courses leading to a Master's degree. In addition, a Pre-MAT program has been established to support prospective Master's participants who do not have the required prerequisites—most notably in college-level Calculus. Through the El Paso MSP, UTEP faculty have also developed a Physical Science degree plan for the MATS focusing on Physics and Chemistry.

Identifying and supporting prospective teachers is also taking place through promotion of alternative certification for prospective teachers with math and science backgrounds, high school teaching magnet programs and the recruitment of undergraduate engineering students into secondary math/science teaching.

Local concerns—that also reflect national trends—pertaining to support for new math and science teachers are being addressed through a newly established teacher induction program, into which new teachers have been enrolled and participate in an intensive 2-year support program.

Intensive support for current teachers is being provided through MSP-supported Staff Developers—a highly qualified cadre of math and science master teachers—who provide professional development, sustained and connected over time, in teachers' classrooms. The focus of the Staff Developers' work includes support for teachers in covering topics and activities most central to improving the quality of their teaching.

Building School and District Capacity

The second key element of the El Paso MSP focuses on supporting the improvement of math and science instruction in preK-12 classrooms via leadership at the school and district levels, as well as support for increased parent engagement.

The MSP recognizes that a factor critical to implementing and sustaining standards-based instruction is the ability of school administrators to facilitate and actively support teacher efforts for improving teaching and learning. Principal Academies include attention to results-based reform efforts, data analysis, strategic planning, and content-focused coaching aimed at the successful implementation of the K-16 math and science curriculum frameworks. In addition, regular, ongoing meetings are held with superintendents and other district leaders to ensure coherence, consistency, ownership, and support for all MSP goals and activities.

Finally, the El Paso MSP recognizes the role of parents and the community in supporting math and science reform. Key efforts include monthly meetings for parent teams from area schools addressing the importance of high-level mathematics and science for preparation for higher education, and the role parents play in supporting greater student achievement. Parents' sessions also address state standards, and the rigors and demanding nature of the state assessment. Discussions also center on the expectations of students and implications of the "No Child Left Behind" Act. Community engagement through the El Paso MSP has also focused on preparation for higher education.

Aligning Curriculum, Instruction, and Assessment of Mathematics and Science Education

To support students in achieving higher levels of mathematical and scientific understanding in preparation for higher education, the El Paso MSP is working with mathematicians and scientists from UTEP and EPCC, along with preK-12 teachers, in developing high level mathematics and science curriculum course frameworks that will guide instruction and assessment at all levels. To date, frameworks have been developed in K-12 mathematics, Algebra I and Algebra II. This year, work is commencing with Geometry, and Chemistry and Physics.

The institutionalization of the curriculum frameworks will be carried out through the development and enactment of policies pertaining to the implementation of the frameworks across local districts, EPCC and UTEP. Also critical will be the alignment and integration of the

frameworks with instruction provided by postsecondary educators, including math/science teacher faculty at both higher education institutions.

Increasing College-Going Rates

Along with the improvement of science and mathematics education, a priority of MSP is to ensure that increasing numbers of El Paso area students recognize the importance of a postsecondary education and early preparation for college. The fourth key element of the El Paso MSP focuses on: 1) increasing college-going rates through the THINK COLLEGE NOW Initiative; 2) increasing attention to the work of counselors in supporting students' preparation for higher education; and, 3) implementing the College of Engineering's Infinity Project—a curriculum for high school students that addresses concepts and skills related to engineering.

Implementing a Research Agenda that Advances Knowledge and Understanding about the Systemic Improvement of Mathematics and Science Instruction

The final key element in the El Paso MSP recognizes that research on the impact of MSP efforts informs critically important decisions about what works, where, and under what conditions. Priorities include the implementation of math/science field based research pedagogical laboratories, which are underway; research training for El Paso MSP Staff Developers and District Directors; and the awarding of small research grants to teachers**.**

Responses to Specific Questions

How will you ensure that participants—mathematicians, scientists, and engineers from higher education as well as K-12 teachers and administrators—remain active in the program? What role, if any, will businesses and non-profit organizations play in the partnership?

The involvement of El Paso MSP partners across higher education and preK-12 institutions, as well as in the business and non-profit community, is focused on building a long-term commitment toward shared goals for the students in the El Paso community. This commitment starts with the leadership at higher education institutions and school districts—many of whom play key roles in the El Paso MSP. Beyond the fulfillment of the priorities laid out, these leaders are focused on ways in which our partnership can sustain itself for the long term. The University of Texas at El Paso, for example, has committed to graduating more credentialed mathematics and science teachers and increasing the number of teachers holding math and science masters degrees. MSP districts, too, are committed to continue prioritizing and supporting mathematics and science education after MSP, including the use of district resources to support continued intensive professional development and acquisition of the best standards-based math and science materials. El Paso MSP partners, including business, community organizations and civic leaders, will continue to participate actively in promoting key MSP priorities, including making presentations to students, parents and community groups about the importance of math and science literacy and of going to college.

What type of professional development will your partnership provide for pre-service and in-service teachers? How will improvements in teacher content knowledge and pedagogy be assessed?

Professional development for both pre-service and in-service teachers will be provided to increase and sustain the quantity and quality of preK-12 mathematics and science teachers. Teachers' content knowledge will also be enhanced by the K-16 curriculum alignment frameworks that include expectations about what student should know and be able to do from kindergarten through higher education.

Assessing the impact of these efforts in supporting both teacher content knowledge and pedagogy will occur through a combination of strategies. Teachers receiving a Masters of Arts in Teaching either Mathematics or Science will be required to have attained Master's-level content knowledge in order to graduate. At the same time, prospective teachers coming to the profession through alternative certification and engineering backgrounds will be expected to have mastered their content knowledge in order to proceed with their certification. The familiarity of both pre-service and inservice teachers with the rigorous content addressed in the frameworks, and its integration into classroom practices will also be measured. Classroom teacher observation protocols and surveys, for example, will provide a guide for formative evaluation of teachers' progress in implementing the content addressed in the frameworks.

Is your award a sufficient size to develop and test your education reform models and achieve your partnership goals? How will the partnership coordinate with state educational agencies to foster and sustain the reform effort after the award period expires?

The support we have received from the National Science Foundation has been extremely beneficial in allowing us to develop and refine our reform models from which longer-term implementation and sustainability can be built. This work is an enormously costly proposition. Over the past 20 years, we have seen first-hand that making the transformations expected through the partnership are expensive and take significant time. What has been so valuable is the significant NSF investment in promoting the value of our preK-16 partnerships and those in other communities. This leadership and attention to our work has also allowed the El Paso MSP to more effectively leverage resources from our own community.

Though we do not directly coordinate our efforts with the Texas Educational Agency, we continue to share products and lessons from the work of the El Paso MSP. One key example, will be the broader dissemination of the mathematics and science curriculum frameworks, which have applicability across every school in the State.

Plans for Evaluation of the El Paso Math/Science Partnership

As you can see, the El Paso MSP is an ambitious initiative with multiple and interrelated components. Thus to evaluate it, we must monitor the implementation and results of many strands of activity within a clear, overarching framework. Our evaluation has two key aims:

accountability through the rigorous measurement of results; and ongoing improvement in our programs.

We believe in holding ourselves accountable for measuring change in the lives of young people. We have begun with the identification of key objectives and benchmarks for which indicators have been developed to measure the major outcomes of the Partnership. Examples include trends regarding the percent of area students passing the mathematics and science portions of the Texas Assessment of Knowledge and Skills, and the percent of students completing a college-preparatory high school program. We use student data to identify the overall results of our efforts and to highlight areas in which more work is needed. Looking at student achievement and attainment over time is an indispensable part of our work, and we appreciate federal support for the collection and rigorous analysis of student data.

In order to enhance our program we utilize evaluation planning, data collection and reporting that include the systematic monitoring of interrelated program improvements intended to contribute to success on each outcome indicator. We examine the extent to which we are achieving our numerical benchmarks and track backwards to examine interim steps and program interventions that influenced their outcomes.

Because we are committed to improving the programs that our partnership has launched in El Paso, we need to gather and systematically analyze evidence about those programs in our own context. We welcome this nation's growing commitment to supporting experimental research in education, while recognizing that full-blown experimental trials cannot provide all the answers that our MSP partnership needs. We have programs in place right now that have achieved varying degrees of success which we need to understand in detail. While we await better answers from the education research community, we are working with an external evaluator to conduct comparisons and analyses, on the ground, in our own classrooms.

The program elements of the El Paso MSP are intended to make a difference in the supply of well-qualified math and science teachers, in school and district leadership, in classroom practices, and ultimately in student achievement. Our evaluation plan takes into account that all partners have roles to play, and multiple new and established programs to support. Thus, our evaluation plan will focus attention on the following: the implementation of key program elements across participating districts, schools, and postsecondary departments; the short-term results of implementation; and how the presence or absence of particular program elements contributes to longer-term results.

For example, we will analyze enrollment and completion statistics in a college-preparatory core curriculum, by district, feeder pattern, and student group. Where students are not completing this curriculum at the desired rate, we will identify the courses they are not completing and the program interventions in those subjects that they have or have not experienced. We will also analyze relevant data on school leadership, counseling, and classroom practices affecting those students. These comparative analyses of different conditions and supports across schools will point the way to improvement in our efforts

Similarly, we will look at the rates at which prospective teachers are entering and completing each of the pathways to certification introduced or enhanced through support from the El Paso MSP. Profiles of typical enrollees in each pathway will be compared. Through surveys of participants (and non-participants, such as engineering students who do not choose to enter teaching), we will identify reasons for entry and persistence in these certification routes.

Staff Developers' work will be analyzed from several related perspectives. Teachers and Lead Learners will provide data on the kinds of support they receive from Staff Developers. Through classroom observation, we will follow-up to measure the results of this support infrastructure. The work of Staff Developers will also be examined as one component in a more comprehensive system of teacher induction and support that may help in teacher retention as well as the improvement of classroom practice. We will identify facilitating mechanisms and barriers to effective staff development that may exist in district and state policies, principals' actions, teachers' schedules, and the learning opportunities available to the Staff Developers themselves.

The evaluation questions about alignment will also be addressed through measures of the enacted curriculum. In addition, we will look at progress in curriculum alignment all the way from elementary through postsecondary education.

The research component of the El Paso MSP will be a subject of our evaluation in its own right, as a significant intervention intended to engage classroom teachers, postsecondary faculty, and others in systematic reflection on practice and results. We will study the operations of such key elements as the collaborative working relationships between postsecondary faculty and preK-12 teachers, which have traditionally proved difficult to establish. We will also incorporate the results of teacher research into our inquiry.

In summary, by tracking back from key benchmark indicators to the specific mechanisms intended to affect them, by understanding instances of success and failure and by taking into account the mutually reinforcing nature of related program efforts, we expect to generate reports that are realistic, useful, and analytically sound. Evaluation is helping us hold ourselves accountable for results, and it is helping us strengthen our programs as we go forward.

Lessons Learned

Let me share with you some of the lessons we have already learned over the 13 months of implementing MSP. First, we have learned that this work must be undertaken K-16. Reforming K-12 will only work for the long-term if our teacher preparation programs in colleges and universities have themselves improved, if they too are focused on the best national content standards, if they are also aggressively working toward fully engaging students in the learning process. And, given that teacher preparation encompasses the entire University, not just Colleges of Education, those that educate prospective teachers in the core subject areas—the Colleges of Science and Liberal Arts—must also work toward improving teacher quality.

A second lesson learned is that partnerships must address the issue of K-16 curriculum alignment, that is, seamlessly linking what is taught at each point in the education continuum—from elementary, middle and high school—with what is expected and taught at community

college and at university. The MSP Mathematics and Science Alignment brings together K-12 teachers from all MSP school districts, MSP staff developers, as well as mathematics faculty from the El Paso Community College, and faculty from UTEP's Colleges of Education, Engineering and Science. A major goal of the initiative is to develop course outlines along with curriculum frameworks, that will be implemented by teachers across the twelve districts. Those outlines and frameworks provide clear and specific information about math and science content at each grade level that all students must understand and be able to do and the level of rigor demand at which they must be able to do them in order to prepare for college level mathematics and science. The outline is mapped to textbooks and materials used by the districts and is not limited to any one adopted mathematics program. We have completed work on Algebra I and II, as well as K-8 and are beginning work on Geometry, K-8 science and the high school science courses.

A third lesson learned is that we must ensure a full and robust set of support and assistance mechanisms necessary for building school capacity. Our professional development work is focused on building knowledge and leadership about school improvement and institutional change among principals and other site administrators, district leaders, college and university faculty and deans. We have, however, prioritized teachers and making sure that all who teach math and science are fully qualified. MSP is helping to do that through increasing the number of teachers certified and earning masters in math and science. In addition, we also provide professional development to ensure a deep understanding of concepts, among in-service teachers to the point where they can build student capacity to do high level math and science. We not only focus on content but also on pedagogical content. That is, implementation of instructional practices appropriate to specific math and science concepts. This deepening of knowledge and practice requires a reorganization of where and how we deliver professional development. The majority of that development is now provided in classrooms by MSP staff developers, thus bridging the teacher learning and practice gap. Through all of this professional development work, we continue to raise issues of teacher and administrator beliefs and attitudes about who can learn—and who cannot—and support educators to begin to come to terms with their beliefs and the impact of those beliefs on their students' achievement.

Conclusion

Woven throughout this brief picture of our MSP work I trust that you've been able to see the elements that are critical to us:

- Equity
- Partnerships—in particularly K-16 partnerships
- Deep commitments and understanding about what all children deserve.

This is work very much in progress. We've had our share of things that have worked very well—and those that haven't. Through it all we remain committed to continuing to learn what it takes to bring about real and lasting improvements for every single student in our community.

Thank you Mr. Chairman for this opportunity to testify, and for your interest in the El Paso Math/Science Partnership. I would be happy to respond to any questions.

M. SUSANA NAVARRO

Susana Navarro graduated from the University of Texas at El Paso with a major in political science in 1968. After working at the U.S. Commission on Civil Rights in Washington on a landmark study of Mexican American education, she began her graduate studies at Stanford University, where she received her Ph.D. in educational psychology in 1980.

After earning her doctorate, she worked with the Mexican American Legal Defense and Education Fund (MALDEF) for five years as National Director of Research and Policy Analysis. From 1985 until early 1991, she worked with the Achievement Council, a statewide non-profit organization in California, which she helped create, as Associate then Executive Director.

In 1991, she returned to El Paso, where with regional education, business and civic leaders, she founded the El Paso Collaborative for Academic Excellence, an organization which she has headed since its inception. The Collaborative, a citywide effort to improve academic achievement among all young El Pasoans, is now in its twelfth year of operation and has become a national model for urban school reform. Dr. Navarro's work has been featured in numerous national publications, including Education Week, The Chronicle of Higher Education and Phi Delta Kappan. She serves as Principal Investigator for the El Paso Mathematics and Science Partnership, a $30 million grant, which was awarded to the Collaborative in 2002. In addition to MSP and other grants from the National Science Foundation, the Collaborative has received support for its systemic reform work from the Pew Charitable Trusts, the US Department of Education, the Lucent Foundation, Exxon and the Coca Cola Foundation, among others.